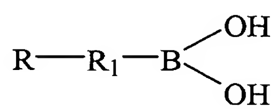
WHAT IS CLAIMED IS:

1. An analyte detector comprising:

a device having a surface, wherein the device is capable of detecting a charge adjacent to the surface; and

a plurality of molecules, each molecule bonded to the surface of the device, the molecules having a structure (I):



(I)

wherein,

R is a ligand bonded to the surface of the device;

R_1 is a spacer having 5 to 50 carbon atoms.

2. The analyte detector according to claim 1, wherein the ligand is covalently bonded to the surface.

3. The analyte detector according to claim 1, wherein R_1 is a spacer having 14 to 24 carbon atoms.

4. The analyte detector according to claim 1, wherein R_1 is a $(C_{14} - C_{24})$ alkylene, $(C_{14} - C_{24})$ alkenylene, $(C_{14} - C_{24})$ cycloalkylene, $(C_{14} - C_{24})$ heterocyclylene, $(C_{14} - C_{24})$ arylene, or $(C_{14} - C_{24})$ heteroarylene.

5. The analyte detector according to claim 1, wherein R_1 is a $(C_{14} - C_{20})$ alkylene, $(C_{14} - C_{20})$ alkenylene, or $(C_{14} - C_{20})$ arylene.

6. The analyte detector according to claim 1, wherein the device is a field effect transistor having a source and a drain, and the surface is located between the source and drain.

7. The analyte detector according to claim 1, wherein the surface comprises gold, silver, copper, lead, tantalum oxide, silicon oxide, zirconium oxide, tin oxide, or group III-IV semiconductors, or mixtures thereof.

8. The analyte detector according to claim 1, wherein the ligand is thiol, siloxane, or phosphate.

9. The analyte detector according to claim 6, wherein the field effect transistor has a dielectric layer extending between at least part of the source and the drain, and further has a conductive layer disposed on a portion of the dielectric layer, with the plurality of molecules bonded to the conductive metal layer.

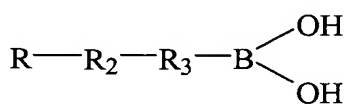
10. The analyte detector according to claim 9, wherein the conductive metal layer is discontinuous and has a fill factor of less than 75%.

11. The analyte detector according to claim 9, wherein the plurality of molecules form a monolayer of molecules having a structure (I) orientated substantially orthogonal to the conductive metal layer.

12. An analyte detector comprising:

a field effect transistor having a gate surface; and

a monolayer of molecules, each molecule bonded to the gate surface, the molecules having a structure (II):



(II)

wherein,

R is a ligand bonded to the gate surface;

R_2 is a $(C_{10} - C_{24})$ alkylene, or $(C_{10} - C_{24})$ alkenylene;

R_3 is an $(C_3 - C_{14})$ cycloalkylene, $(C_3 - C_{14})$ heterocyclylene, $(C_3 - C_{24})$ arylene, or $(C_3 - C_{14})$ heteroarylene.

13. The analyte detector according to claim 11, wherein R_2 is a $(C_{10} - C_{20})$ alkylene.

14. The analyte detector according to claim 11, wherein R_3 is a phenylene or naphthalene.

15. The analyte detector according to claim 11, wherein the ligand is thiol, phosphate, or siloxane.

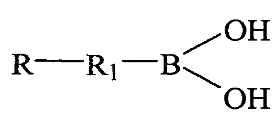
16. The analyte detector according to claim 11, wherein the gate surface is a conducting surface.

17. The analyte detector according to claim 11, wherein the gate surface is a non-continuous conducting surface of the field effect transistor, and the monolayer of molecules form a non-conducting layer on the semi-conducting surface.

18. The analyte detector according to claim 11, wherein the gate surface is an insulating surface.

19. A method of detecting an analyte comprising the steps of:

bonding a plurality of molecules to a surface of a device, wherein the device is capable of detecting a charge provided adjacent to the surface, the molecules having a structure (I):



(I)

wherein,

R is a ligand bonded to the surface of the device;

R_1 is a spacer having 5 to 50 carbon atoms; and

forming an anionic complex with an analyte and the molecule having the structure (I).

20. The method according to claim 19, further comprising the step of:

using the device to detect a charge adjacent to the surface, wherein the charge is formed by the anionic complex.

21. The method according to claim 19, wherein the forming step comprises forming an anionic complex with a cis-2 diol or cis-3 diol molecule.

22. The method according to claim 19, wherein the forming step comprises forming an anionic complex with a glucose molecule.

23. The method according to claim 19, wherein the bonding step comprises bonding a plurality of molecules to the surface to form a monolayer of molecules having a structure (I) orientated substantially orthogonal to the surface.

24. The method according to claim 20, wherein the detecting step comprises detecting a surface charge on or adjacent to a field effect transistor gate surface formed by the anionic complex.

25. The method according to claim 24, wherein the detecting step comprises detecting a source-drain current of the field effect transistor.

26. The method according to claim 19, wherein the forming step comprises forming an anionic complex with an analyte and the molecule having the structure (I) at a pH from 5 to 8.

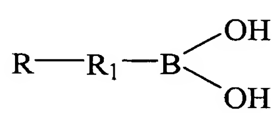
27. The method according to claim 19, wherein the forming step comprises forming an anionic complex with an analyte and the molecule having the structure (I) in vivo.

28. The method according to claim 19, wherein the bonding step comprises bonding a molecule of structure (I) wherein R_1 is an $(C_5\text{-}C_{50})$arylene.

29. A glucose sensor for providing an output signal indicative of a glucose concentration, the glucose sensor comprising:

a surface, where the glucose sensor is capable of detecting a charge adjacent to the surface and providing an output signal that is related to the detected charge;

a plurality of molecules that produce the charge adjacent to the surface, wherein the charge produced is related to the glucose concentration, each molecule is bonded to the surface of the glucose sensor, and the molecules having a structure (I):



(I)

wherein,

R is a ligand bonded to the surface;

R_1 is a spacer having 5 to 50 carbon atoms.

30. The glucose sensor according to claim 29, wherein the ligand is covalently bonded to the surface.

31. The glucose sensor according to claim 29, wherein R_1 is a spacer having 14 to 24 carbon atoms.

32. The glucose sensor according to claim 29, wherein R_1 is a $(C_{14} - C_{24})$ alkylene, $(C_{14} - C_{24})$ alkenylene, $(C_{14} - C_{24})$ cycloalkylene, $(C_{14} - C_{24})$ heterocyclylene, $(C_{14} - C_{24})$ arylene, or $(C_{14} - C_{24})$ heteroarylene.

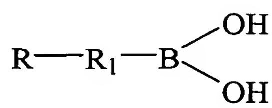
33. The glucose sensor according to claim 29, wherein R_1 is a $(C_{14} - C_{20})$ alkylene, $(C_{14} - C_{20})$ alkenylene, or $(C_{14} - C_{20})$ arylene.

34. A system for controlling glucose concentrations in a patient's blood stream, comprising:

an insulin pump for providing insulin to the patients blood stream;

a glucose sensor for providing an output signal indicative of the glucose concentration in the blood stream, the glucose sensor having a surface where the glucose sensor is capable of detecting a charge adjacent to the surface and providing an output signal that is related to the detected charge, the glucose sensor further having a plurality of molecules that produce the charge adjacent to the surface, wherein the charge

produced is related to the glucose concentration in the blood stream, each molecule is bonded to the surface of the glucose sensor, and the molecules having a structure (I):



(I)

wherein,

R is a ligand bonded to the surface of the glucose sensor;

R_1 is a spacer having 5 to 50 carbon atoms.

a controller coupled to the insulin pump and the glucose sensor, the controller adapted to activate the insulin pump when the output signal from the glucose sensor indicates that the glucose concentration in the blood stream has risen above a predetermined level.